Status Report No. 5

for

National Aeronautics and Space Administration Grant

NsG 280-62

on

UNPUBLISHED PRELIMINARY DATA

THEORETICAL RESEARCH ON THE PERIODIC MOTION AND STABILITY

OF A SMALL MASS UNDER THE GRAVITATIONAL ATTRACTION OF

TWO HEAVY BODIES

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Calculations on the restricted 3-body problem for variable mass-ratio

have been completed for some of the representative simple classes. The

classes (a), (f), and (n) have been studied for the full mass-ratio range

$(-1 \leq \gamma \leq 1)$, classes (β), (δ), $(\alpha-\delta)$, and (g-f) for the partial range

$-1 \leq \gamma \leq 0.93$. These were done on the IBM 7094 at the University of Illinois.

A paper containing the results of this work has been recently submitted

to, and accepted by, the Proceedings of the Danish Academy for publication

later this year. The results also make up NASA Technical Report No. 2,

February 1, 1965, from this Grant.

Work has begun on the question of the stability of motion for a simpler

non-linear system. A working machine-language program for the accurate

Illiac II computer has been completed, and should allow rapid analysis of the

mapping properties of the system. By applying the theorems of Arnol'd and

Moser, these results can be used to discuss stability. The ideas and results

should then carry over to the restricted 3-body problem with suitable

modifications.